Testbed Roundup: The GOES-R Proving Ground

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http://www.goes-r.gov

4th NOAA Testbed and Operational Proving Ground Workshop
College Park, MD, April 2-4, 2013

Contributors

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ASRC Federal Space and Defense

GOES-R Proving Ground

The GOES-R Proving Ground engages NWS in pre-operational demonstrations of selected capabilities of next generation GOES

- Objective is to bridge the gap between research and operations by:
  - Utilizing current systems (satellite, terrestrial, or model/synthetic) to emulate future GOES-R capabilities
  - Infusing GOES-R products and techniques into NWS operations with emphasis on AWIPS and transitioning to AWIPS-II.
  - Engaging in a dialogue to provide feedback to developers from users

- The Proving Ground accomplishes its mission through:
  - Sustained interaction between developers and end users for training, product evaluation, and solicitation of user feedback.
  - Close coordination with GOES-R Algorithm Working Group (AWG) and Risk Reduction programs as sources of demonstration products, promoting a smooth transition to operations

Intended outcomes are Day-1 readiness and maximum utilization for both the developers and users of GOES-R products, and an effective transition to operations

GOES-R Products

Baseline Products

Advanced Baseline Imager (ABI)

- Aerosol Detection (Including Smoke and Dust)
- Aerosol Optical Depth (AOD)
- Clear Sky Masks
- Cloud and Moisture Imagery
- Cloud Optical Depth
- Cloud Particle Size Distribution
- Cloud Top Height
- Cloud Top Phase
- Cloud Top Pressure
- Cloud Top Temperature
- Derived Motion Winds
- Derived Stability Indices
- Downward Shortwave Radiation: Surface
- Fire/Hot Spot Characterization
- Hurricane Intensity Estimation
- Land Surface Temperature (Skin)
- Legacy Vertical Moisture Profile
- Legacy Vertical Temperature Profile
- Radiances
- Rainfall Rate/QPE
- Reflected Shortwave Radiation: TOA
- Sea Surface Temperature (Skin)
- Snow Cover
- Total Precipitable Water
- Volcanic Ash: Detection and Height

Geostationary Lightning Mapper (GLM)

- Lightning Detection: Events, Groups & Flashes

Space Environment In-Situ Suite (SEISS)

- Energetic Heavy Ions
- Magnetospheric Electrons & Protons: Low Energy
- Magnetospheric Electrons: Med & High Energy
- Magnetospheric Protons: Med & High Energy
- Solar and Galactic Protons

Magnetometer (MAG)

- Geomagnetic Field

Extreme Ultraviolet and X-ray Irradiance Suite (EXIS)

- Solar Flux: EUV
- Solar Flux: X-ray Irradiance

Solar Ultraviolet Imager (SUVI)

- Solar EUV Imagery

Future Capabilities

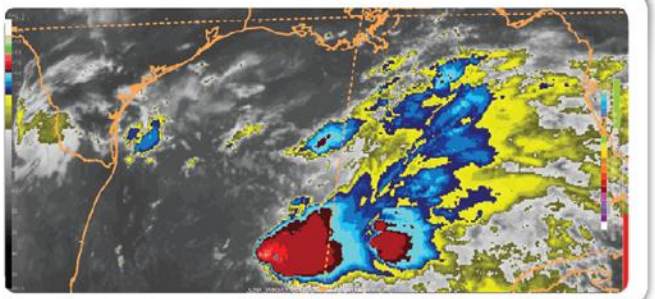
Advanced Baseline Imager (ABI)

- Absorbed Shortwave Radiation: Surface
- Aerosol Particle Size
- Aircraft Icing Threat
- Cloud Ice Water Path
- Cloud Layers/Heights
- Cloud Liquid Water
- Cloud Type
- Convective Initiation
- Currents
- Currents: Offshore
- Downward Longwave Radiation: Surface
- Enhanced “V”/Overshooting Top Detection
- Flood/Standing Water
- Ice Cover
- Low Cloud and Fog
- Ozone Total
- Probability of Rainfall
- Rainfall Potential
- Sea and Lake Ice: Age
- Sea and Lake Ice: Concentration
- Sea and Lake Ice: Motion
- Snow Depth (Over Plains)
- SO_2 Detection
- Surface Albedo
- Surface Emissivity
- Tropopause Folding Turbulence Prediction
- Upward Longwave Radiation: Surface
- Upward Longwave Radiation: TOA
- Vegetation Fraction: Green
- Vegetation Index
- Visibility

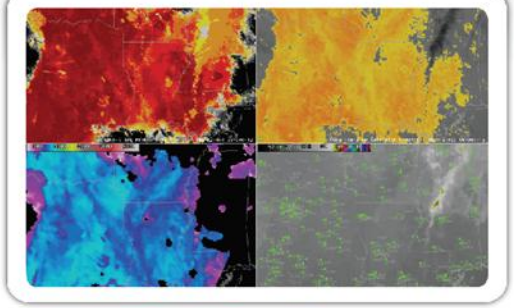
2012 Demonstrations

- Hazardous Weather Testbed
  - Focus on Severe Storms
- NHC/Joint Hurricane Testbed
  - Focus on tropical cyclones/hurricane intensity and track
- Aviation Weather Testbed
  - Focus on High Impact Convective Weather
- OPC and SAB (Camp Springs MD)
  - Focus on offshore thunderstorms
- High Latitude and Arctic Experiment (Alaska Region)
  - Focus on precipitation/snow/cloud/ash/aviation
- HPC and SAB (Camp Springs MD)
  - Focus on precipitation/QPF
- Air Quality (UMBC)
  - Focus on aerosol detection
- Pacific Region (Hawaii)
  - Focus on tropical cyclones/heavy rainfall/aviation
- Space Weather (NWS SWPC: Boulder CO)
  - Focus on GOES-R like level 2 products

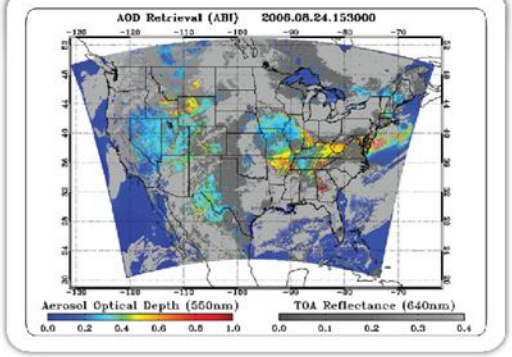
GOES-R Proving Ground Partners



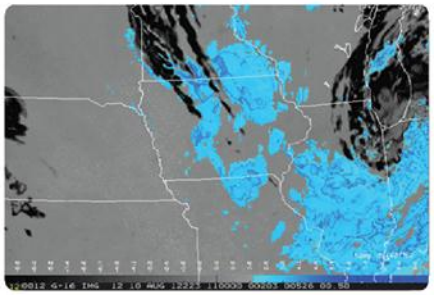
AWC – Kansas City, MO IR Imagery of Oceanic Storms



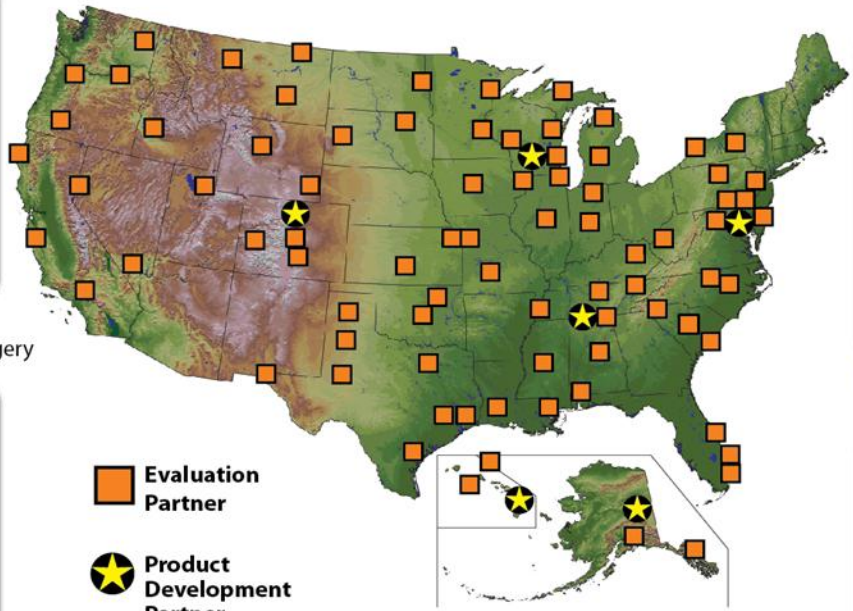
CIMSS/STAR – Madison, WI
Fog/Low Stratus Product

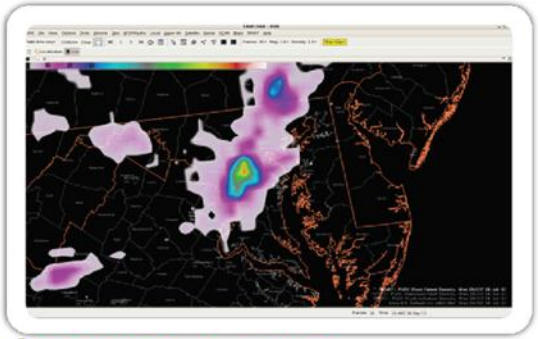


STAR/UMBC – College Park, MD
Aerosol Optical Depth

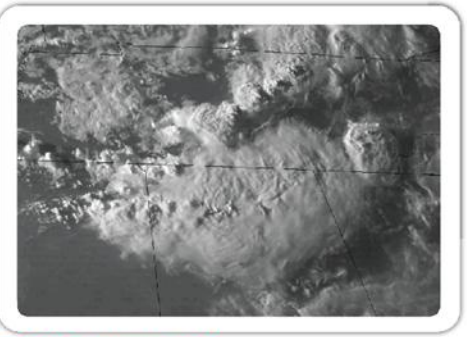


CIRA/STAR – Ft. Collins, CO
ABI Synthetic Low Cloud Enhancement Imagery

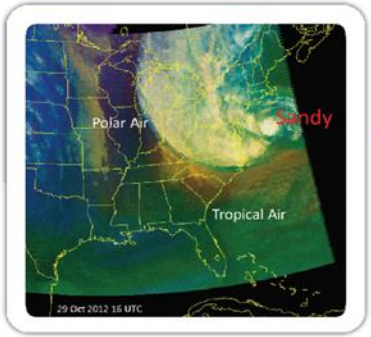




SPoRT/NASA – Huntsville, AL
GLM Lightning Density



SPC – Norman, OK
Severe Storms 1-Min Visible Imagery of Overshooting Tops



NHC – Miami, FL
RGB Air Mass for Hurricane Sandy

GOES-R Proving Ground Reports

THE GOES-R PROVING GROUND

Accelerating User Readiness for the Next-Generation Geostationary Environmental Satellite System

BY STEVEN J. GOODMAN, JAMES GURKA, MARK DEMARIA, TIMOTHY J. SCHMIT, ANTHONY MOSTEK, GARY JEDLOVEC, CHRIS SIEWERT, WAYNE FELTZ, JORDAN GERTH, RENATE BRUMMER, STEVEN MILLER, BONNIE REED, AND RICHARD R. REYNOLDS

By demonstrating the advanced capabilities of the next generation of geostationary satellites, the proving ground addresses user readiness and the research-to-operations-to-research loop.

The Geostationary Operational Environmental Satellite R series (GOES-R) Proving Ground (PG) is an initiative to accelerate user readiness for the next generation of U.S. geostationary environmental satellites. The GOES-R system is a joint development between the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA), with NASA responsible for the space segment (spacecraft and instruments) and NOAA responsible for the overall program and ground segment. The GOES-R PG is a collaborative effort between the GOES-R Program Office (GPO); NOAA Cooperative Institutes; NASA's Short-Term Prediction Research and Transition Center (SPoRT); National Weather Service (NWS) Weather Forecast Offices (WFOs); NWS National Centers for Environmental Prediction (NCEP); National Environmental Satellite, Data, and Information Service (NESDIS) Office of Satellite and Product Operations (OSPO) and the Center for Satellite Applications and Research (STAR); and NOAA test beds to conduct demonstration activities to gain early experience with GOES-R capabilities in an operational environment. Improved spacecraft and instrument technology will support expanded detection of environmental phenomena, resulting in more timely and accurate forecasts and warnings. The Advanced Baseline Imager (ABI), described by Schmit et al. (2005), is a 16-channel imager with 2 visible channels, 4 near-infrared channels, and 10

AFFILIATIONS: GOODMAN AND GURKA—NOAA/NESDIS/GOES-R Program Office, Greenbelt, Maryland; DEMARIA— NOAA/NESDIS/Center for Satellite Applications and Research, Fort Collins, Colorado; SCHMIT—NOAA/NESDIS/Center for Satellite Applications and Research, Madison, Wisconsin; MOSTEK—NOAA/National Weather Service, Boulder, Colorado; JEDLOVEC—NASA Short-Term Prediction Research and Transition Center, Huntsville, Alabama; SIEWERT—Cooperative Institute for Mesoscale Meteorological Studies, Norman, Oklahoma; FELTZ AND GERTH—Cooperative Institute for Meteorological Satellite Studies, Madison, Wisconsin; BRUMMER AND MILLER—Cooperative Institute for Research in the Atmosphere, Fort Collins, Colorado; REED—General Dynamics Information Technology, Fairfax, Virginia; REYNOLDS—Short and Associates, Inc., Silver Spring, Maryland
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The abstract for this article can be found in this issue, following the table of contents.

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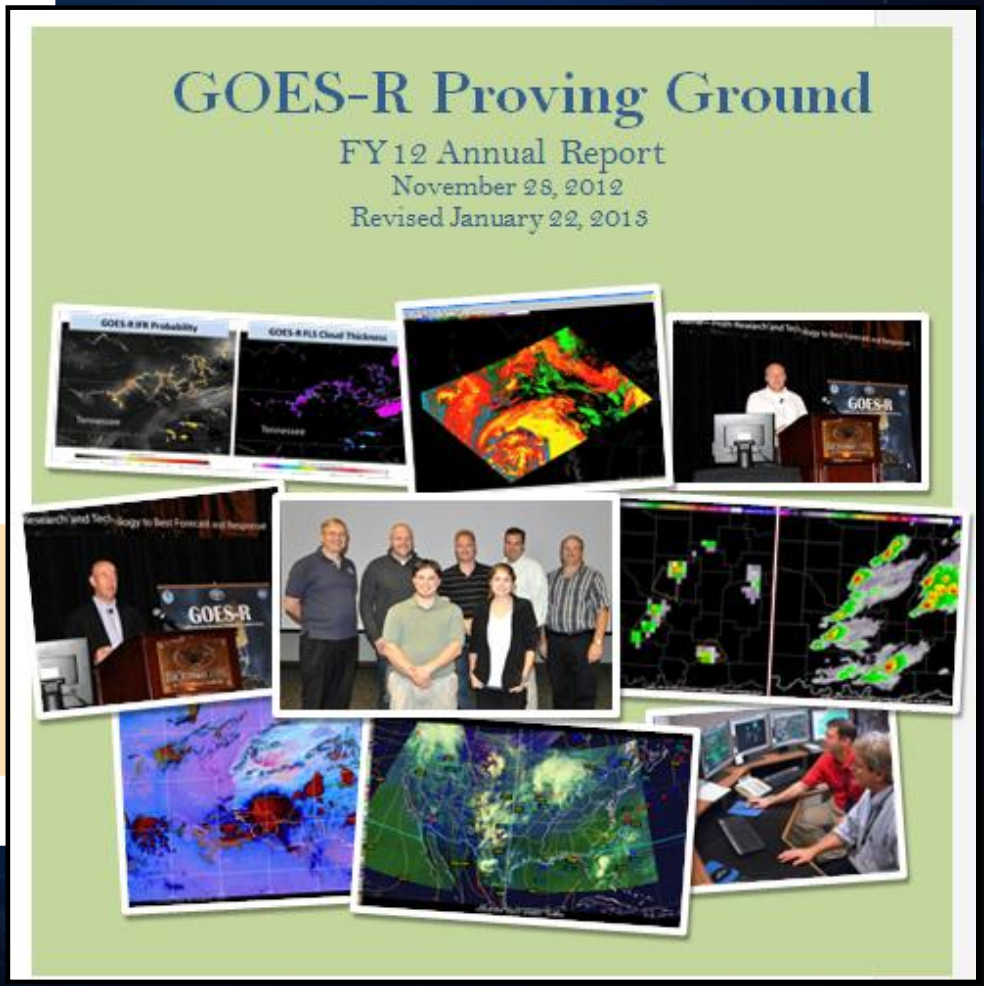
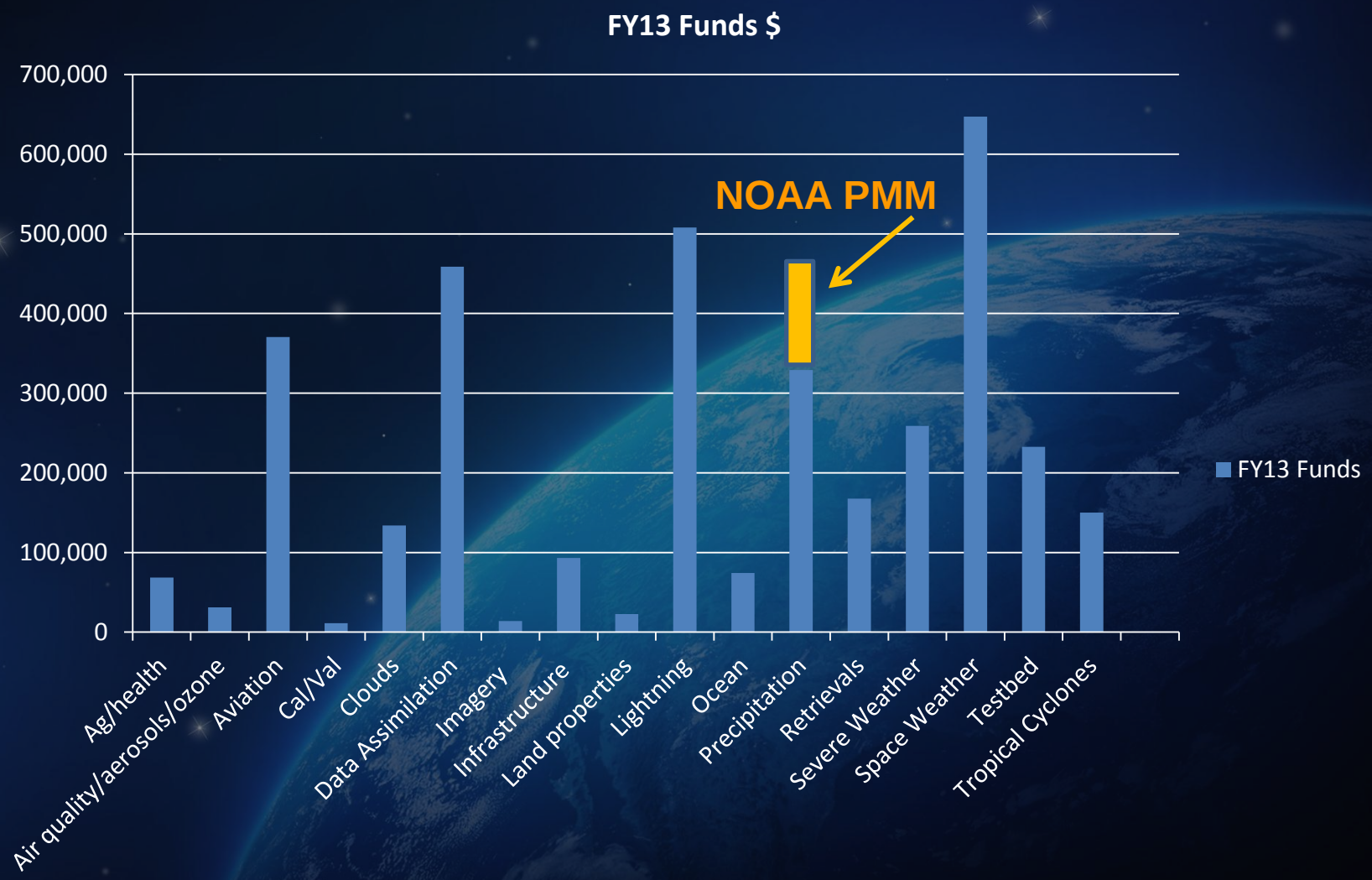
In final form 13 January 2012



3-7

FY13 R3 Funding by Topic



NWS Operational Advisory Team (NOAT) Yearly Guidance Memorandum for the Science and Demonstration Executive Board (SDEB) – FY13

- **Overarching NWS Science and Technology Themes**
  - Convective initiation/Warn on Forecast
  - Best state of the Atmosphere (e.g., 3-d analysis)
  - Next Generation Forecast System
  - Decision Support Information Systems
  - Integration of Social Science into the forecast process
  - Risk Reduction as a core validation activity
- **NWS Weather Ready Nation (WRN)**

*NOAT Priorities for GOES-R Future Capabilities

- 1. Convective Initiation
- 2. Fog and Low Stratus
- 3. Icing Threat plus Cloud Properties (cloud ice water path, cloud layers heights, cloud liquid water, cloud type). Note: these are all interrelated – cloud properties integral to this and other efforts. Also, specific guidance to pursue integrated NWP-centric approaches.
- 4. SO_2 Detection
- 5. Land Surface Model Related (emissivity, vegetation index, vegetation fraction)
- 6. **Precipitation: probability of rainfall, rainfall potential, QPE (Rain Rate)**
- 7. Ice Cover
- 8. Flood and Standing Water (at full resolution)
- 9. Other Priority 2 Products not specifically noted (includes tropopause folding turbulence prediction, enhanced V overshooting top detection, visibility, and all others not covered above).

Although demonstration of products should meet these priorities, NOAT accepts the demonstration of non-baseline products as acceptable if short-term value to operations is expected.

*NOAT- NWS Ops Advisory Team

FY13 Risk Reduction New Starts

GOES R3 Topic	Project/PI
Aviation	Satellite-Detected OT/TOT CIMSS/Velden, LaRC/Bedka
Infrastructure	AWIPS-II Satellite Plug-ins (EPDT) NASA/Jedlovec, STAR-CIRA/DeMaria, STAR-CIMSS/Schmit
Clouds	Fog and Low Stratus Detection STAR/Pavolonis
Lightning	GLM Lightning Jump Algorithm Pre-Operational National Demonstration UAH/Carey, OU-CIMMS-NSSL/Calhoun
Severe Weather	Convective Initiation (GOES-R Fused NWP) UAH/Mecikalski, GSD/Benjamin, STAR/Heidinger

*IAC Recommendation
Science Week March 2013

… Utilization of the LEO high spectral resolution data rendering of moisture vertical and horizontal distributions needs to be encouraged.

Recommendation: Regional forecasts and nowcasts necessary for a Weather Ready Nation will have to make better use of the information content from AIRS, CrIS, and IASI data; GPS data should also be included. Between LEO sounding coverage, GOES-R data should be used to monitor temporal profile changes (atmospheric stability, dq/dt, $V \bullet \nabla q$, $\nabla \bullet q$, etc).

*IAC- GOES-R Independent Advisory Committee

GOES-R NWP Program Updates

- Visiting Scientists- High Impact Weather NWP
  - Haidao Lin- ESRL/CIRA
  - Thomas Jones-NSSL/OU-CIMMS
  - Xiaoyan Zhang- EMC/CICS
- JCSDA Computing Infrastructure Enhancements
  - S4 supercomputer at UW-CIMSS
  - Jibb supercomputer at NASA GMAO
  - Governance and User accounts in place
  - NCEP Global Forecast system installed to advance R2O
- Meetings-Workshops
  - Warn on Forecast-High Impact Weather (Norman, OK, February 5-7)
  - NOAA Satellite Science Week (Virtual, March 18-22)
  - NOAA Testbed-Proving Ground Workshop (College Park, MD, April 2-4, 2013)-focus on High Impact Events
  - NOAA Satellite Conference (College Park, MD, April 8-12)-special session on NWP and Data Assimilation for TCs, hurricanes, and heavy precipitation

SPD Director Greg Mandt and Program Chief Scientist Steve Goodman tour the Super Computer for Satellite Simulation and Data Assimilation Studies (S4) at UW-CIMSS.

The Joint Center in a big box (Jibb) supercomputer at NASA GMAO

GOES 14 SRSOR Experiment

http://cimss.ssec.wisc.edu/goes/srsor/GOES-14_SRSOR.html

- Outcomes: Operational use of ABI and GLM for nowcasting
  - 1 min imagery, 1 minute lightning, 1 min radar volume scans
- Time: August 16-October 31, 2012
- Locations:
  - Norman, OK- NEXRAD, MPAR, OKLMA (primary site)
  - Huntsville, AL- NEXRAD, UAH dual-pol radars, NALMA
  - Sterling, VA- NEXRAD, TDWR, DCLMA
  - Fort Collins, Colorado- NEXRAD, CSU-CHILL, NCLMA
  - Melbourne/KSC, FL- NEXRAD, LDAR II
  - Atlantic Ocean/GulfMex Basin- NASA EV-1 Hurricane and Severe Storm Sentinel-HS3 science flights 20 Sept-5 Oct coincidence with GOES-R products (http://espo.nasa.gov/missions/hs3)

GOES-14 SRSOR 1-min Imagery Experiment

http://cimss.ssec.wisc.edu/goes/srsor/GOES-14_SRSOR.html

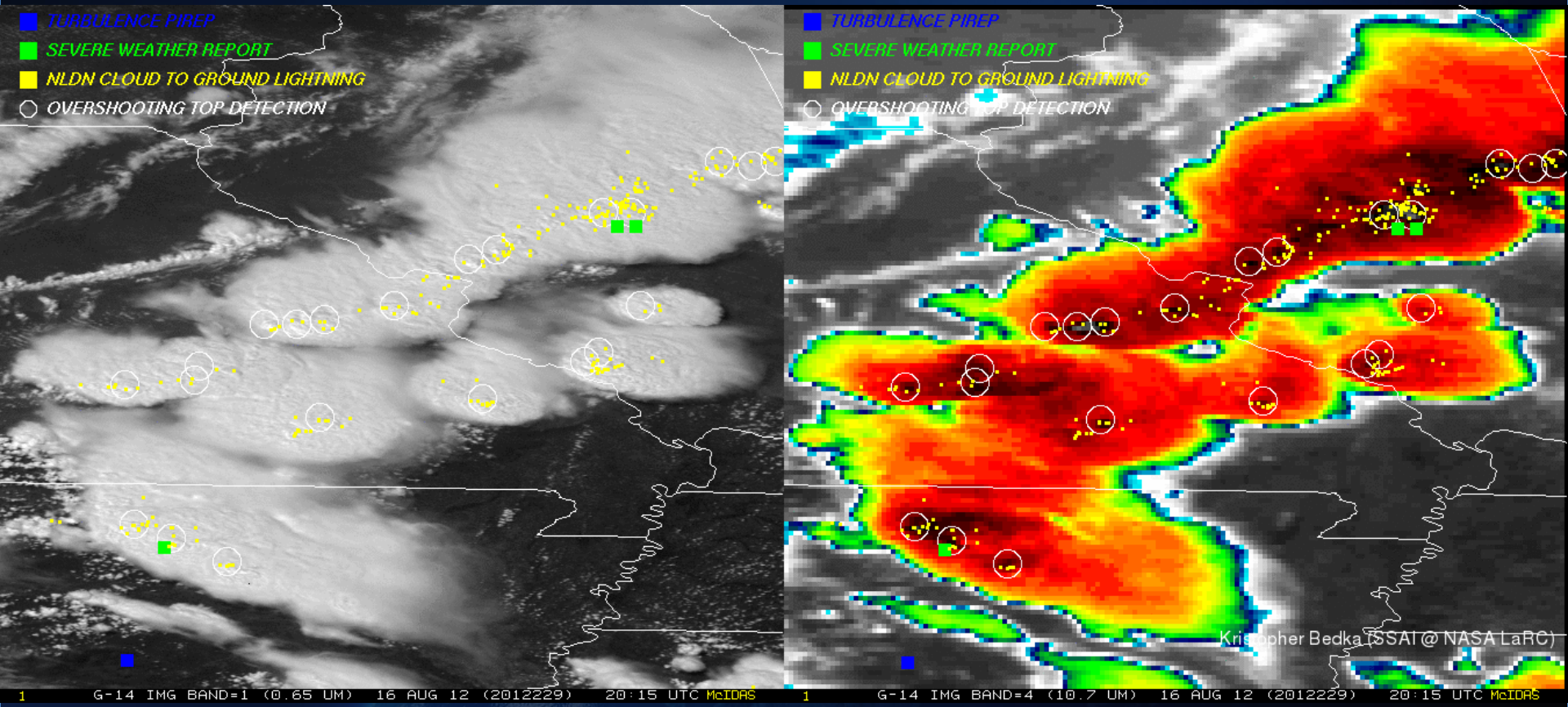
The GOES-R **Algorithm Work Group** in partnership with the GOES-R **Risk Reduction Science Program** and **Proving Ground Demonstration Program** have developed a number of products and decision aids undergoing evaluation and feedback with NWS forecasters across the country.

In the GOES-R Proving Ground, Baseline and Future Capability Products are demonstrated with and receive feedback from forecasters using proxy and simulated data sets. Some of the key products that are very useful for high impact weather forecasts and warnings include:

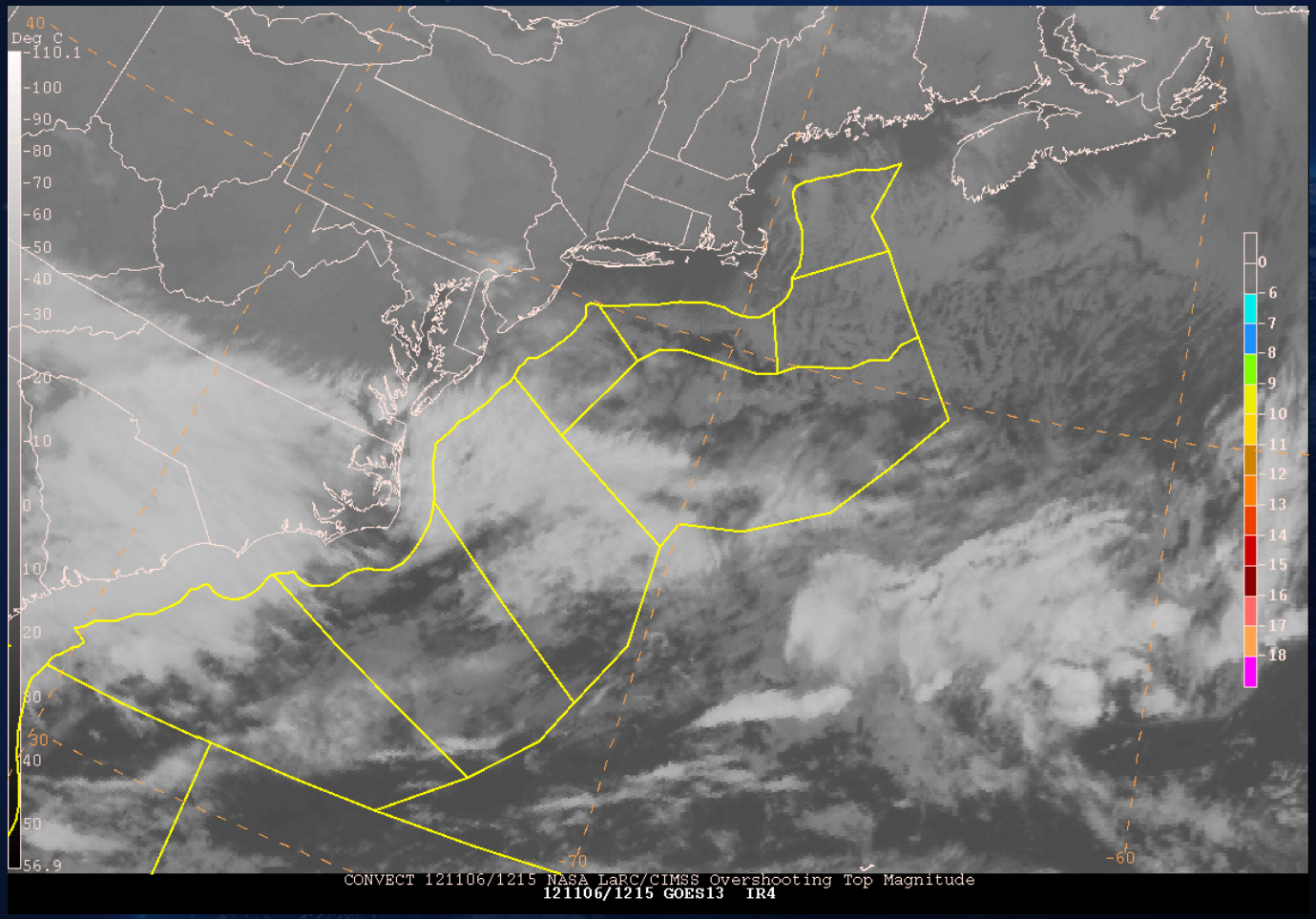
- Cloud and Moisture Imagery
- Hurricane Intensity Estimate
- Convective Initiation
- Overshooting Top Detection
- Lightning Detection

A deficiency in these product demonstrations is our inability to more fully demonstrate the added utility of the GOES-R imagery products at the higher 30 sec to 1 min mesoscale refresh rate that will be routinely possible with the ABI.

GOES-14 SRSOR Experiment :
Overshooting Top Detection



Nor'easter on 11/07/2012
GOES-13 Infrared overlaid with Overshooting Tops



HWT Spring Experiment

- **Forecasters pleased with "Strength of Signal" output from SATCAST CI**
  - Used SATCAST 83% of time during warning ops in EWP
  - Increased SATCAST strength 30-60 min prior to CI with potential for longer lead times for severe
  - "We've seen this all week… UAH gives a heads up that general convection is building, then a short time later UW-CTC typically picks up on the stronger convection building."
  - Increase in false alarm rate over high terrain
  - 88% of participants comfortable using the product

- **Cloud Top Cooling Rate (UW-CTC)**
  - Used CTC 89% of time during warning ops
  - Lead time over occurrence of 60 dBZ composite reflectivity and 1.0 MESH: 10 – 90 min with most around 30 min
  - With knowledge of environment and ongoing supercell activity… warnings issued with CTC

HWT Spring Experiment

- **Simulated Satellite Imagery**
  - "Synthetic WRF imagery can enhance forecasts by providing model data in a familiar satellite format which makes model analysis, model comparison to obs and model forecast projections easier to visualize and understand"

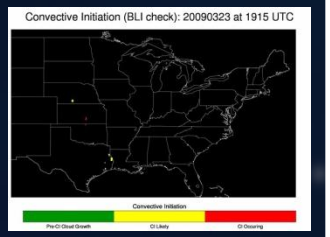
- **Psedo Geostationary Lightning Mapper (pGLM)**
  - Total lightning data showed good correlation with updraft intensity and typically seen "well ahead of the first CG (cloud to ground) flash
  - Pulled focus to individual storms of interest
  - Particularly useful during days with marginally severe and numerous storms over CWA

- **Nearcast**
  - Forecasters used Nearcast product 70% of time in warning ops
  - Found instability fields particularly useful in determining convective maintenance

NWS Vision to Integrate ABI and GLM Products with Other Data and Models

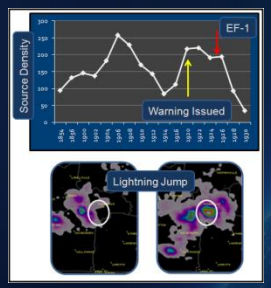
A Potential Operational Example: Convective Initiation/Severe Wx
How can we integrate the information in future tools?

CI

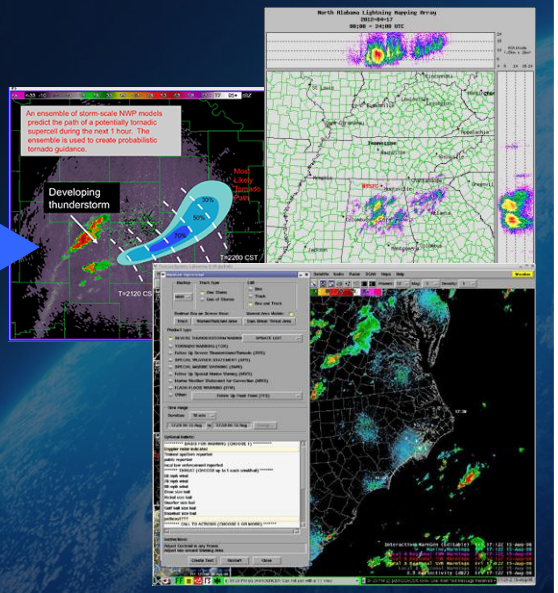


Over-shooting tops

Lightning Jumps



Next Generation Warning System



Why NWS needs this?

Situational Awareness
Warning confidence
Decision Support (venues)

Situational Awareness:

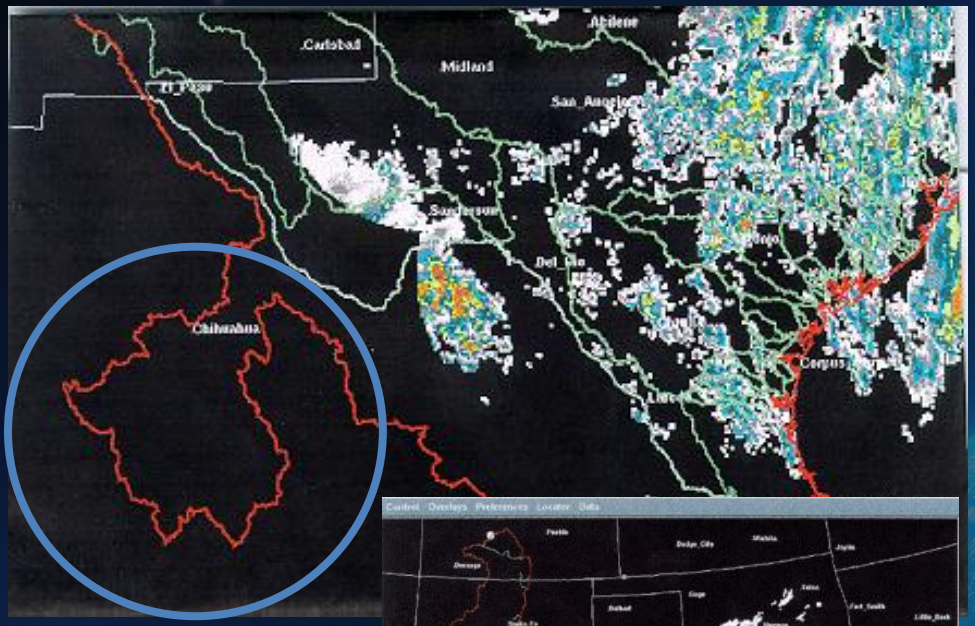
User comment: 'Cloud Top Cooling product is an excellent source of enhancing the situational awareness for future convective initiation, particularly in rapid scan mode'.

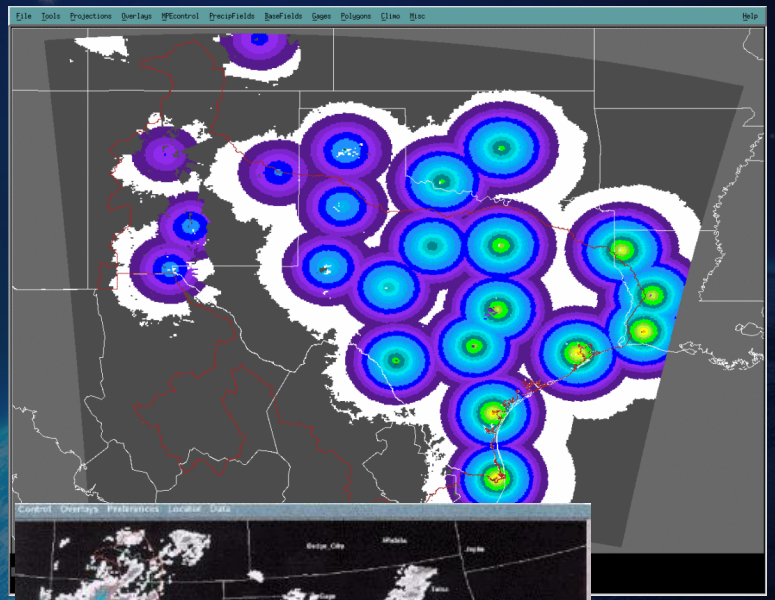
AWC Testbed forecaster

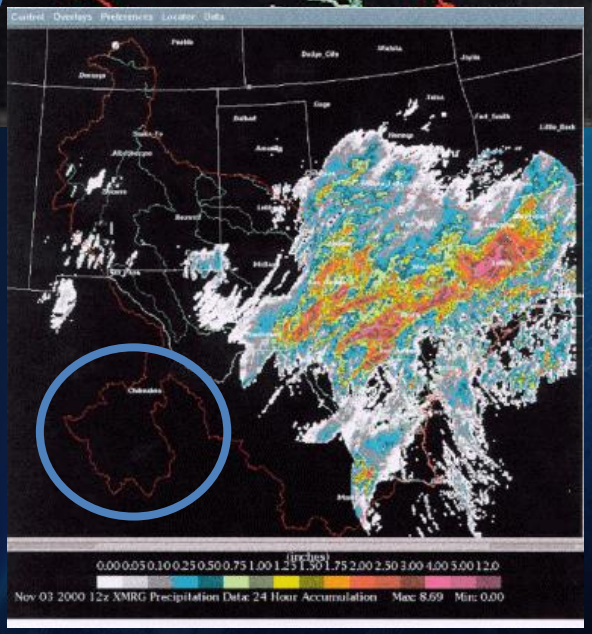
(June 2012)

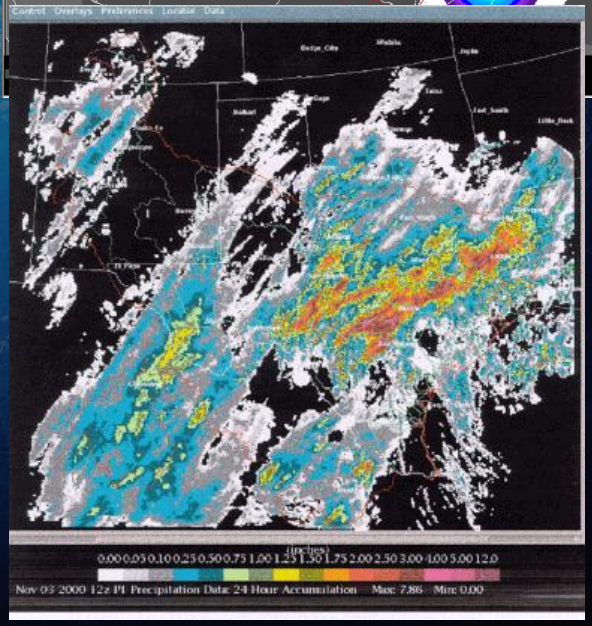
West Gulf RFC Data Gaps

WGRFC is responsible for deriving basin averaged areal precipitation for every location inside the red outline- this is outside the range of the WSR-88D, and there are roughly 15 real-time rain gauges over this region.









Satellite QPE is used where there is no dependable radar estimates or rain gauge data

Greg Story
NWS/WGRFC

Multi-sensor Mosaic

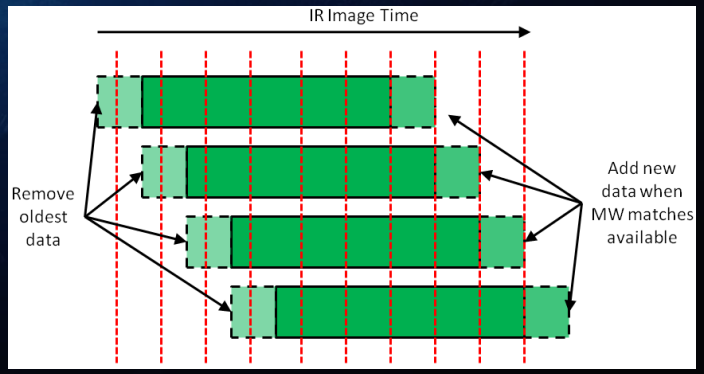
Multi-sensor Mosaic and Satellite Estimates

GOES-R Rain Rate Algorithm- SCaMPR

Self-Calibrating Multivariate Precipitation Retrieval

- The GOES-R Rainfall Rate algorithm (developed from SEVERI proxy data) estimates instantaneous rain rate every 15 min on the ABI full disk at the IR pixel resolution (~ 2 km) with a latency of less than 5 min from image time.
  - Primary focus is operational flash flood forecast support
- The rain rates will be derived from the ABI IR bands, calibrated against rain rates from MW instruments.
- This will allow the rapid refresh and high spatial resolution of IR data from GEO while attempting to capture the accuracy of MW rain rates from LEO.
- A 2-channel version of this algorithm modified for current GOES has been running in real time since August 2011 in support of GOES-R Proving Ground
  - Current GOES Imager does not have the 6.2, 8.5, and 12.0 µm bands

~~$T_{6.19}$~~ $T_{6.7}$	~~$T_{8.5}$~~ - ~~$T_{7.34}$~~
$S = 0.568-(T_{min,11.2}-217\ K)$	~~$T_{11.2}$~~ - ~~$T_{7.34}$~~ $T_{11.2}-T_{6.7}$
$T_{avg,11.2} - T_{min,11.2} - S$	~~$T_{8.5}$~~ - ~~$T_{11.2}$~~
~~$T_{7.34}$~~ - ~~$T_{6.19}$~~	~~$T_{11.2}$~~ - ~~$T_{12.3}$~~



GOES-R Precipitation Projects: FY11-13 GOES-R Risk Reduction

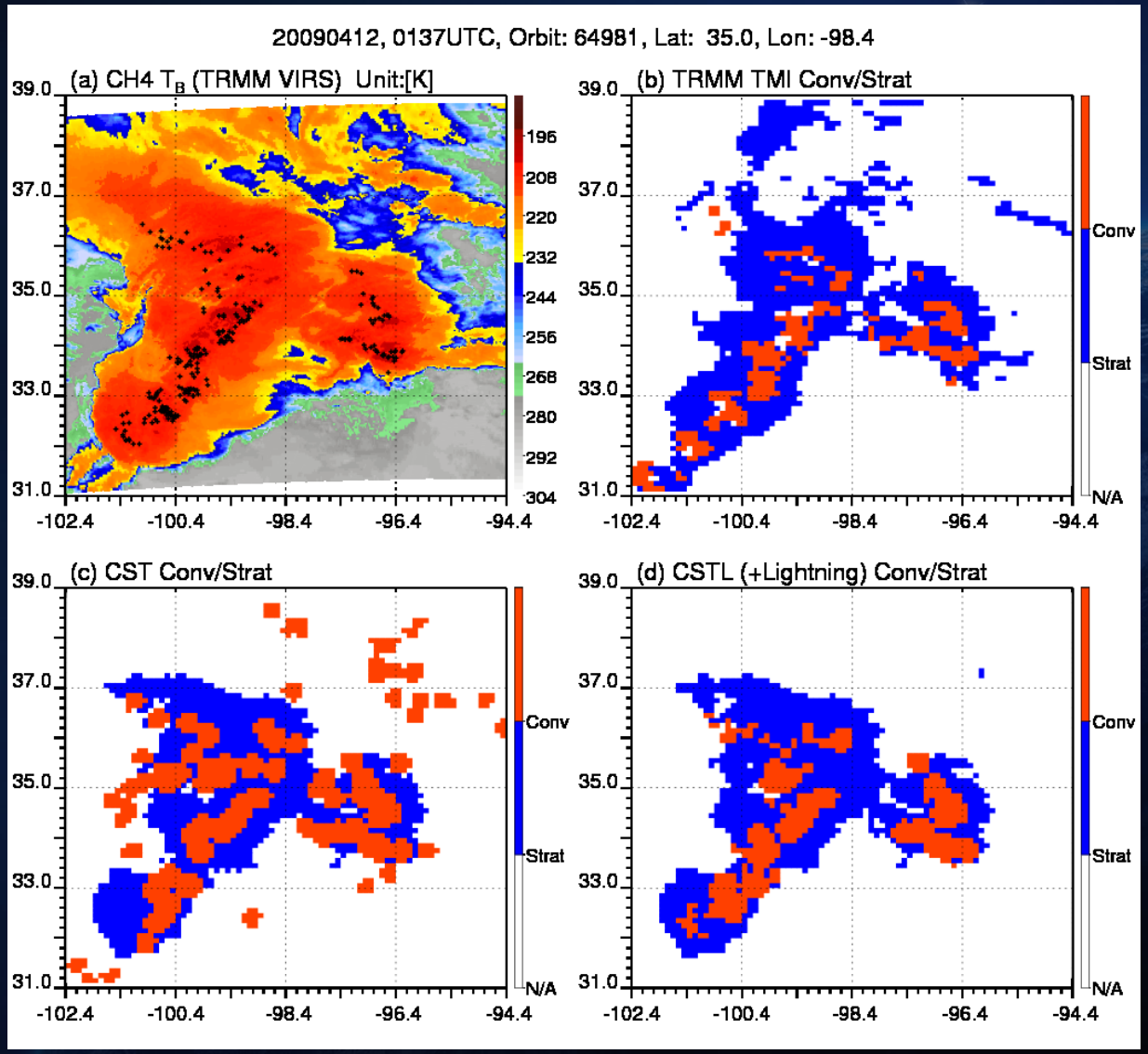
PI	Project
Bob Adler CICS	Combining GLM and ABI Data for Enhanced GOES-R Rainfall Estimates
Xiquan Dong UND	Improving GOES-R Cloud and Precipitation Products Associated with Deep Convective Systems by using NEXRAD Radar Network over the Continental U.S
Bob Rabin NSSL	Improvements to QPE using GOES visible ABI and model data

CST Comparisons

Adler et al.- CST confused by thick cirrus, thick anvil debris, or large MCS cloud shield. Lightning info. (2002-2008) consistently improved the convective detection (POD) by 8%, lowers the false alarm (FAR) by 30%.

IR Tb

CST (Conv/Strat)



PMW (Conv/Strat 10 mm/hr)

CST + Lightning (Conv/Strat)

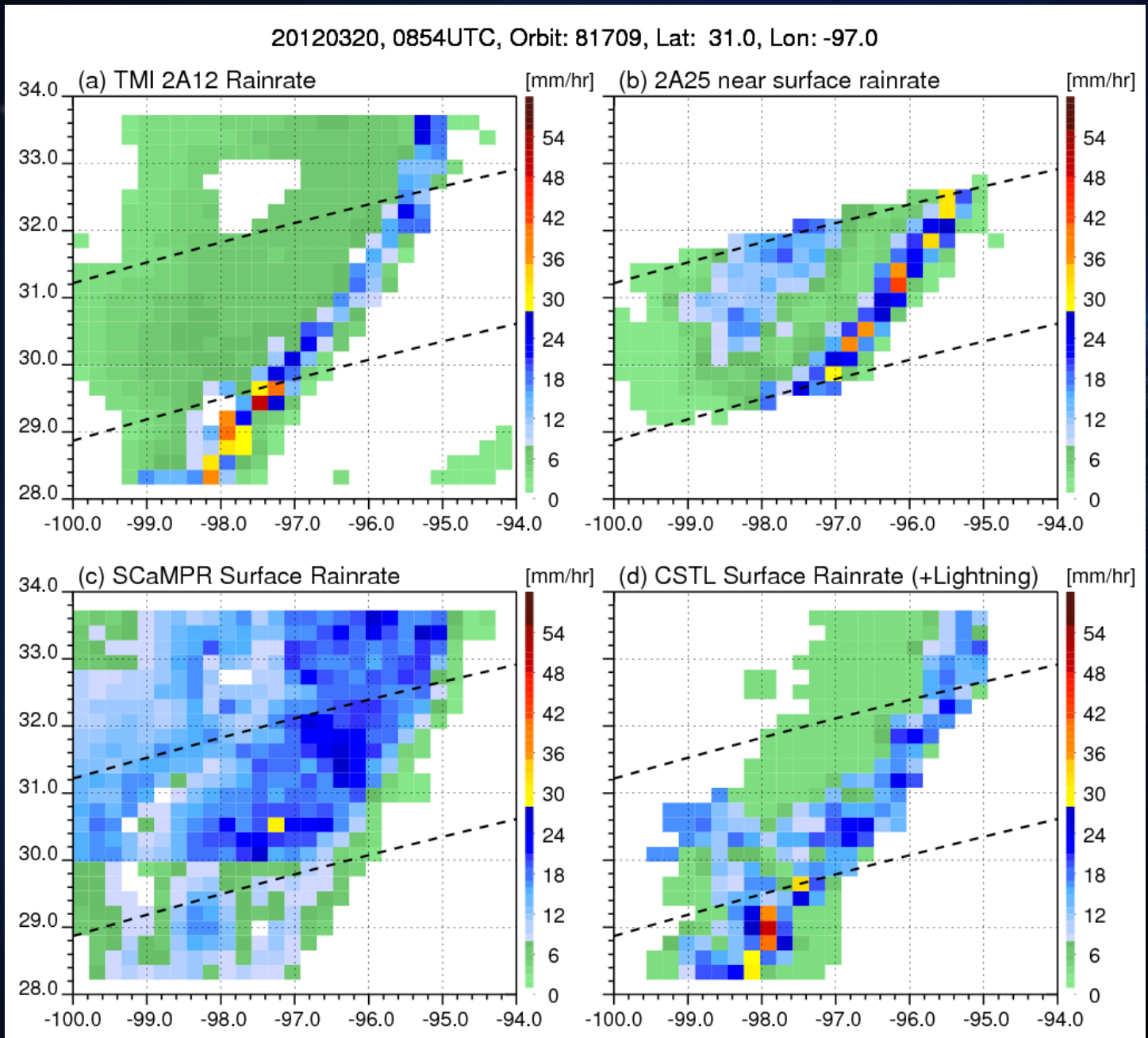
CSTL RR - SCaMPR Comparison

PMW

Radar

SCaMPR

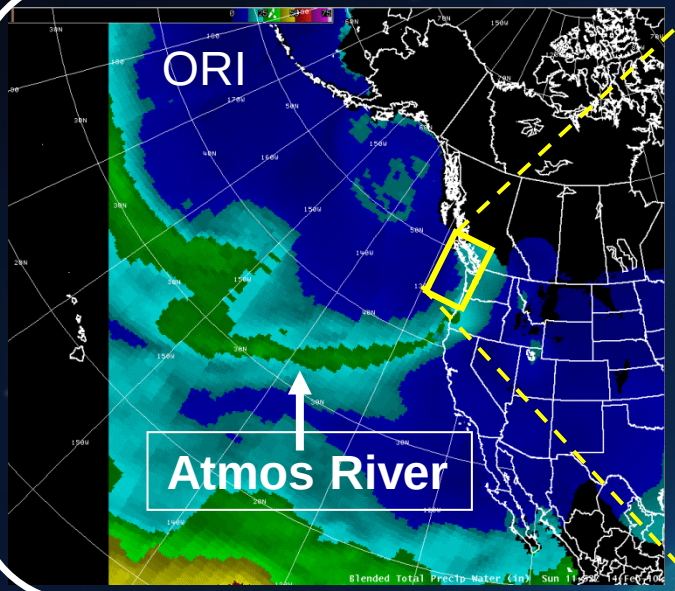
CSTL (Final Product)

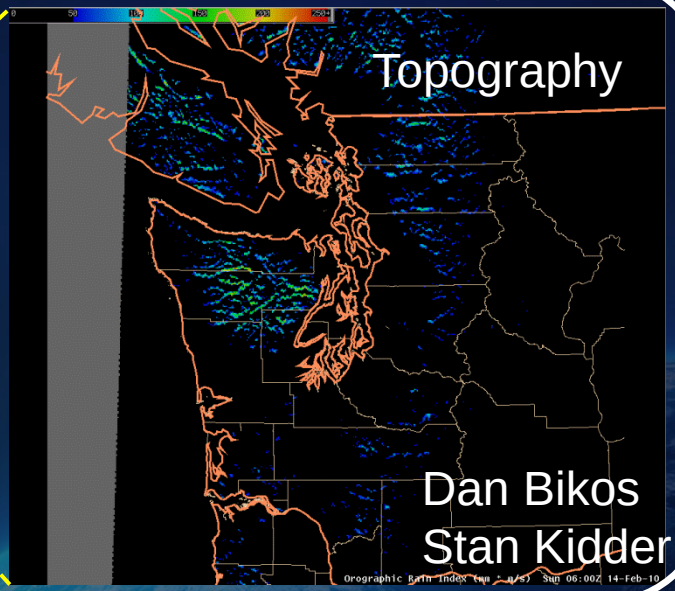


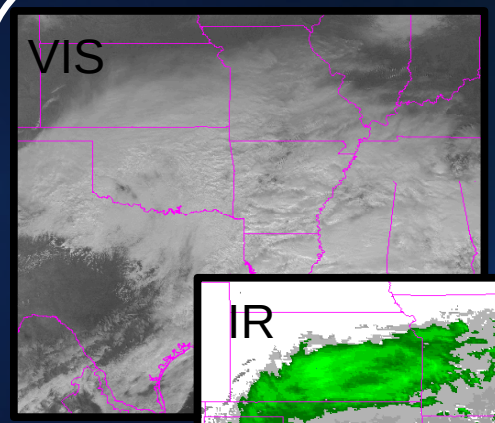
GOES-R Precipitation Projects: New Starts for NOAA Members of the NASA PMM (GPM) Science Team

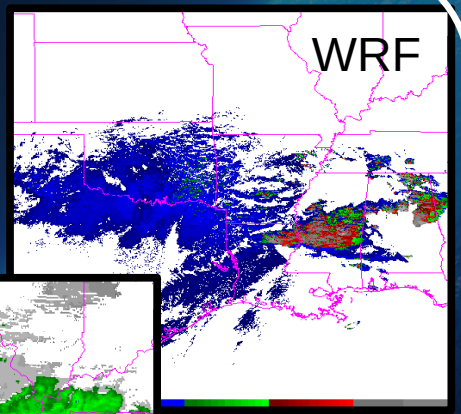
PI	Project
Pingping Xie NWS/CPC	Development of CMORPH and GPM Day-1 Level 3 Precipitation Products for Improved Weather, Climate, and Water Applications
Jonathan Gourley NSSL	WiMerge: Research and Development of Unified CONUS 3-D Mosaics and QPE products

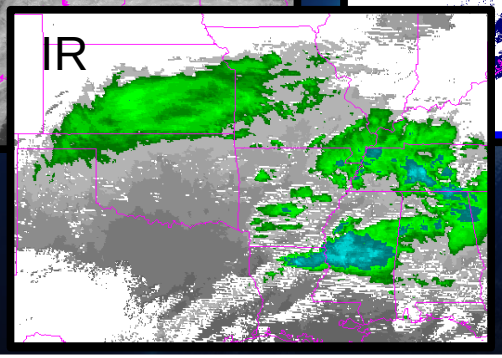
GOES-R Clouds, Moisture



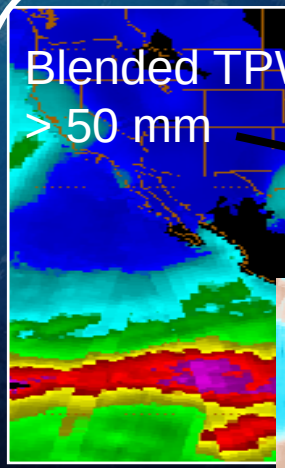


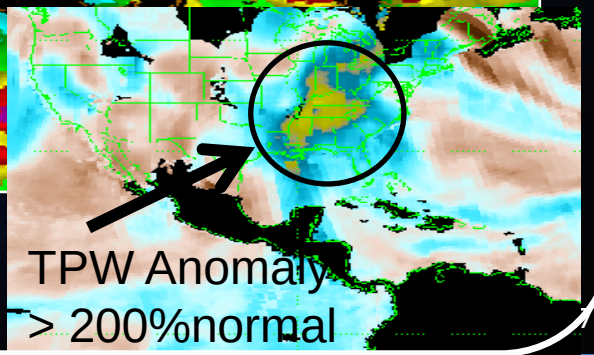






Bob Rabin





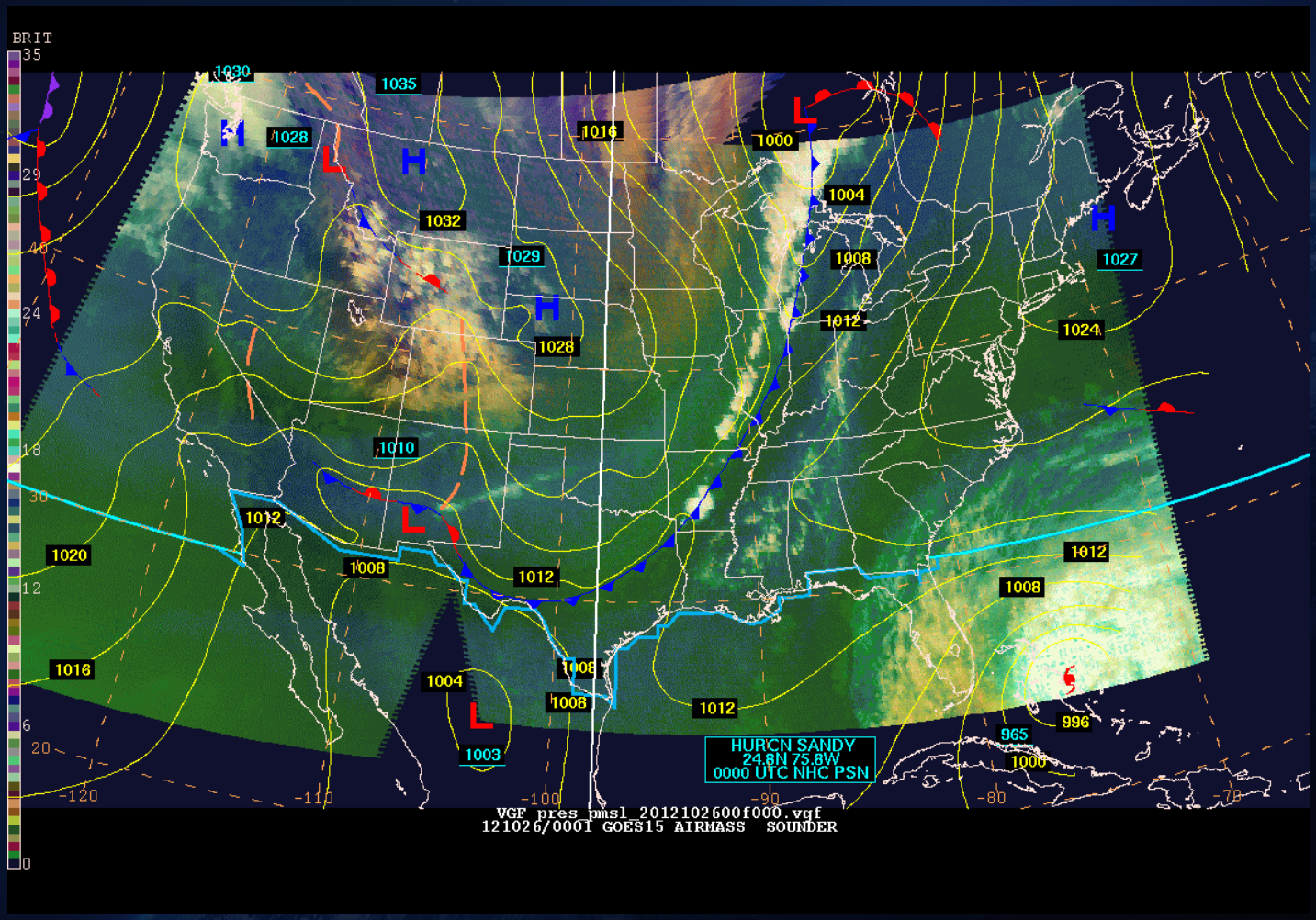
Sheldon Kusselson

NHC Highlights

- Many SRSO cases obtained from GOES-14
  - ASPB and CIMSS lead
- Most RGB and related products in N-AWIPS
  - Air Mass (SEVIRI and GOES sounder), Dust, Pseudo-Natural Color, SAL
- Very positive feedback on RGB Air Mass Product
  - Used in NHC forecast discussions and TAFB tropical weather discussions
- NHC leveraging data distribution from SPoRT to get routine microwave imagery
  - *One of the most useful NHC PG contributions so far*

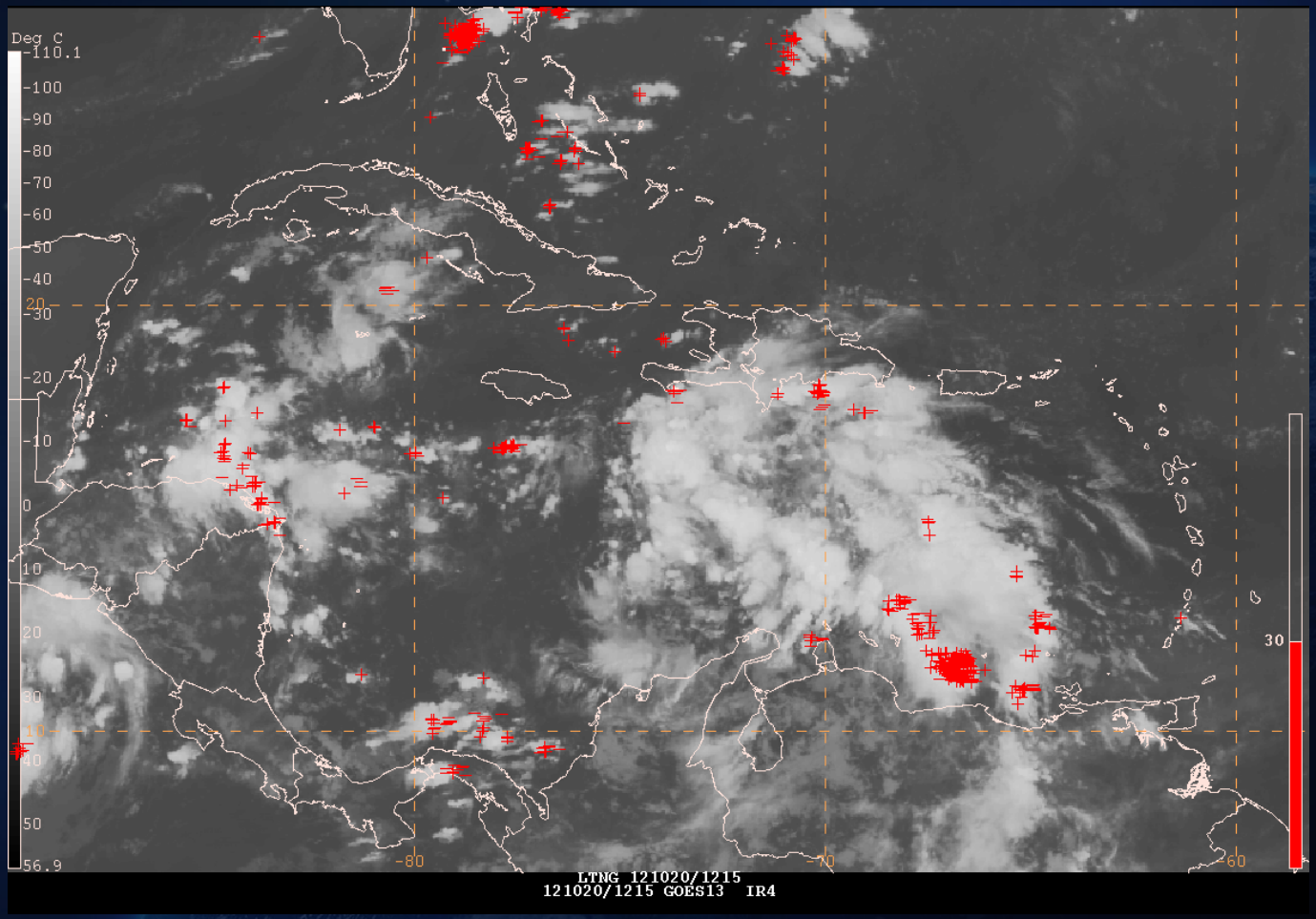
Hurricane Sandy (2012)

GOES-Sounder RGB Air Mass overlaid with WPC surface analysis



Genesis of Hurricane Sandy

GOES-13 Infrared overlaid with 30-minute GLD-360 CG strikes

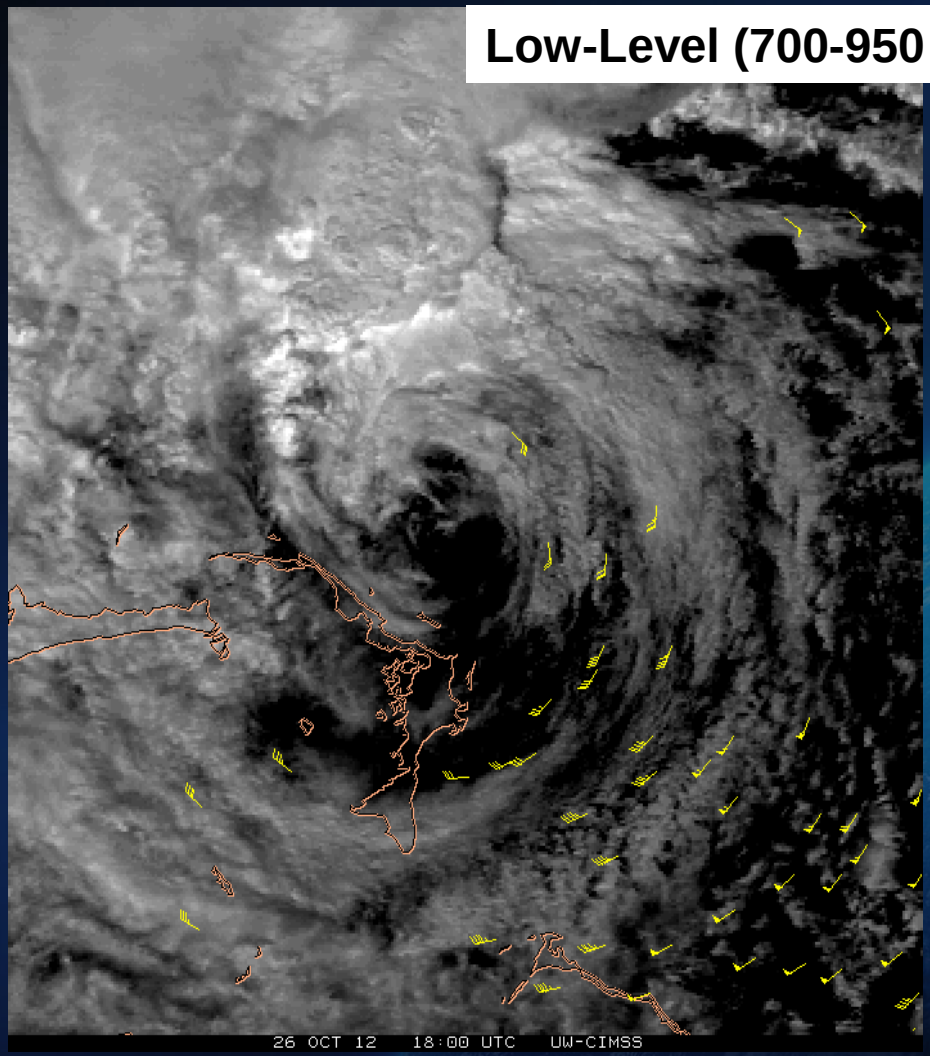


Atmospheric Motion Vectors from GOES-R

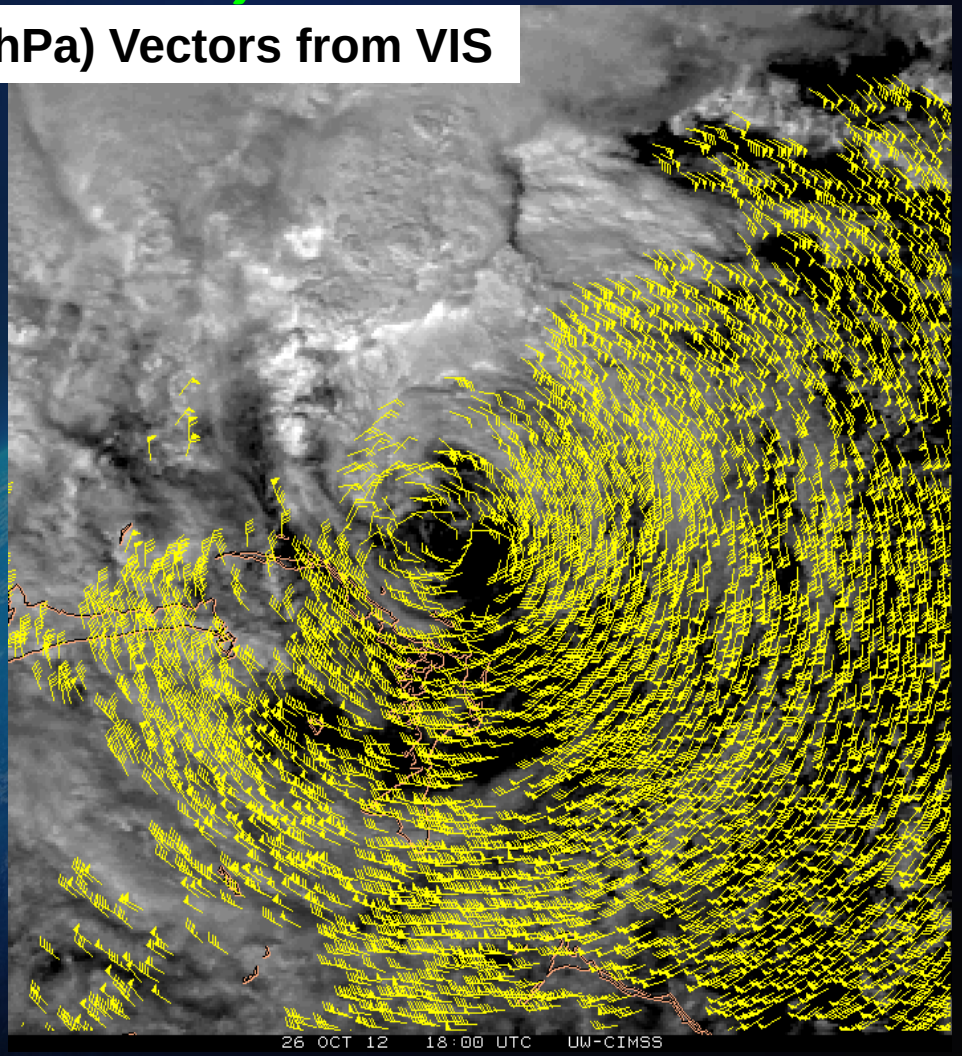
Proxy: AMVs from special GOES-14, 1-min super-rapid-scan operations

Hurricane Sandy

Low-Level (700-950 hPa) Vectors from VIS



AMVs from **15-min images** (routine **GOES** sampling)



AMVs from **1-min images** (meso **GOES-R** sampling)

1800 UTC 26 Oct, 2012

C. Velden (CIMSS)

AWC GOES-R Proving Ground

GOES-R Product	Operational Status
Fog and Low Stratus*	AWC ops – July 2012
Cloud Top Cooling#	AWC ops – Oct. 2012
Overshooting Top/Enhanced "V" Detection#	AWC ops/testbed – Oct. 2012
Simulated Satellite Imagery (NSSL-WRF and NAM Nest)*#	Testbed – ops 2013
Pseudo Geostationary Lightning Mapper#	Testbed – ops 2013
NearCasting Model#	Testbed
ACHA Cloud Height Algorithms*#	Testbed
Flight Icing Threat*	Testbed
GOES-R Convective Initiation (UAH)#	Testbed
RGB Airmass	NAM ops – Oct. 2012

*Winter Experiment: 11-22 February 2013
#Summer Experiment: 12-23 August 2013

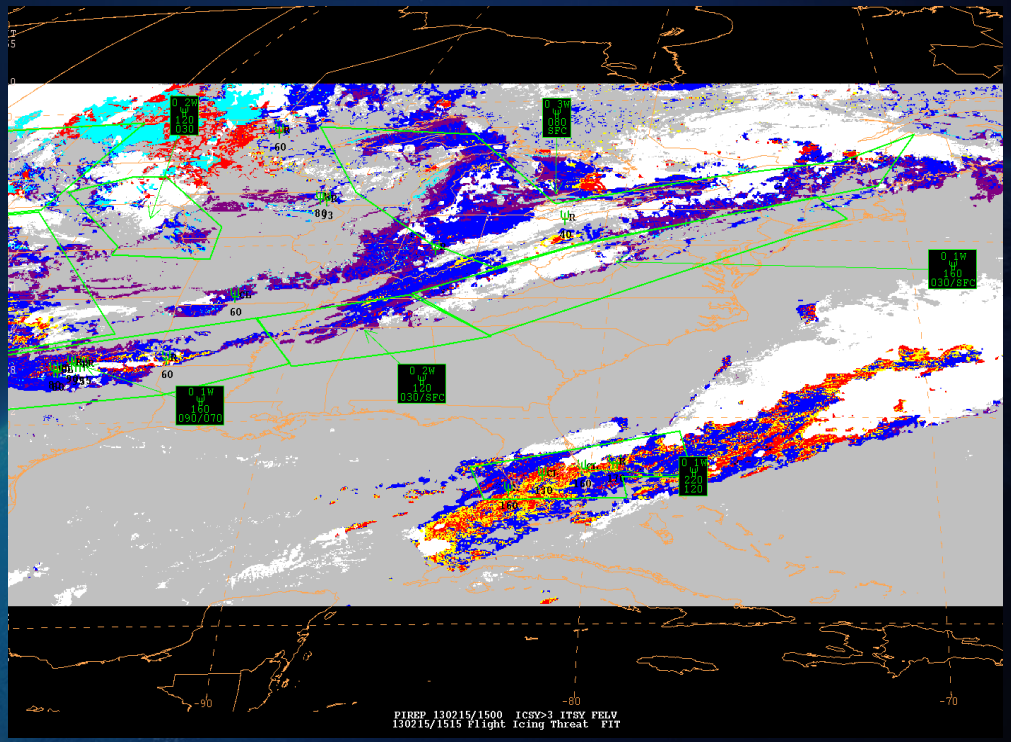
AWC 2012 Highlights

- CTC: ‘this product is an excellent source of enhancing the situational awareness for future convective initiation, particularly in rapid scan mode’
- NearCasting: ‘The product was VERY useful in terms of assessing where the atmosphere would be most favorable for convection should there be a trigger and/or broad-scale lift support’
- Fog/Low Cloud: ‘This product will be very helpful in identifying both advancing and dissipating fog layers, particularly on the West Coast.’
- PGLM: This product showed potential in identifying electrically active areas not associated with CG strikes.

2013 Winter Experiment

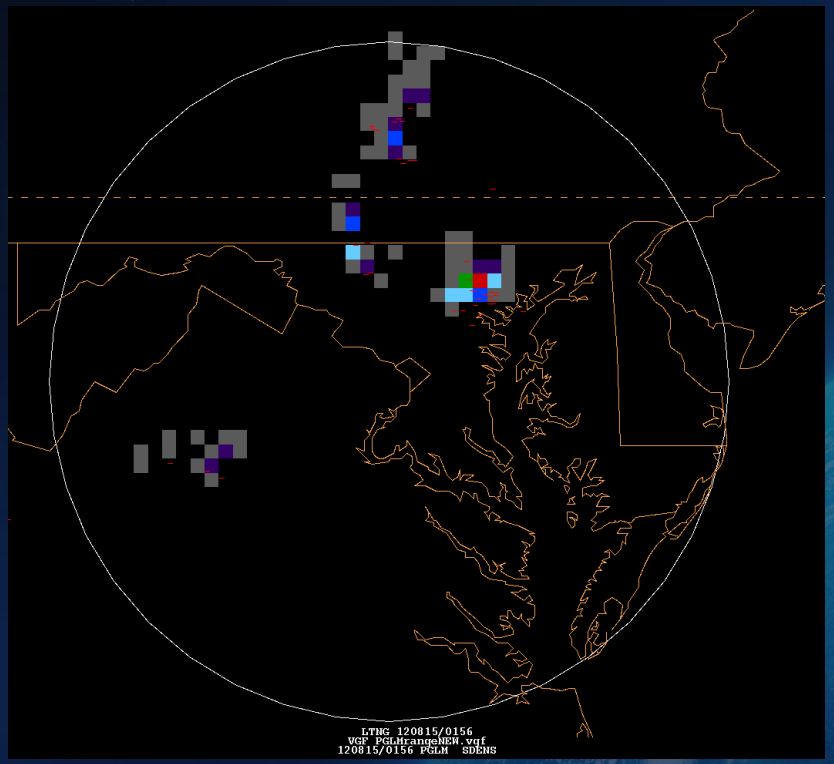
Flight Icing Threat

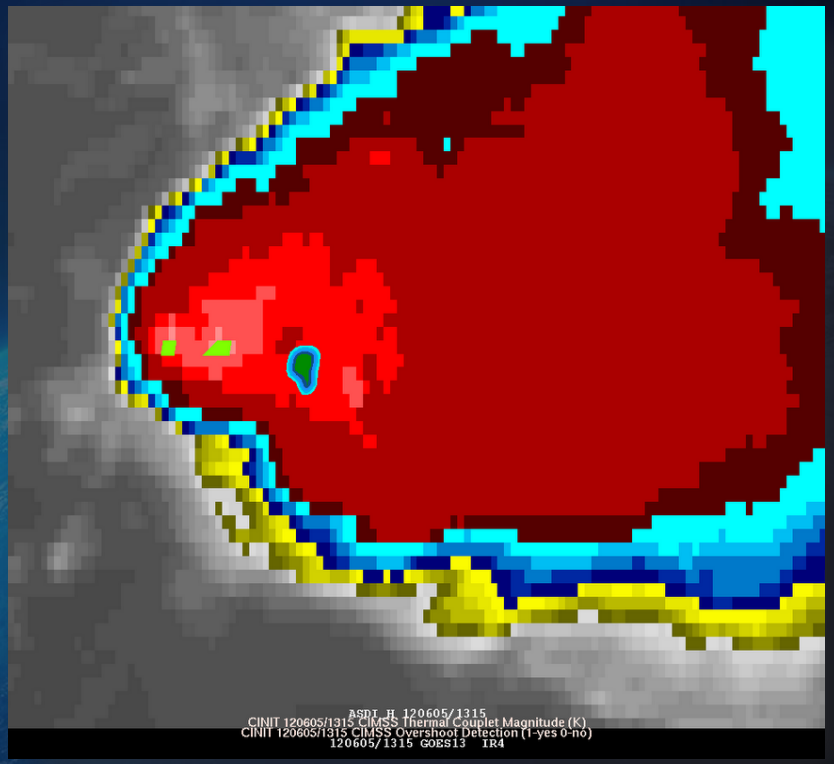
- FIT showed higher icing probabilities over FL and the GulfMex
- FIT was able to pick out areas with a higher likelihood of icing, corroborated by the icing PIREPs in the same region
- Though only over a small portion of the Gulf of Mexico, the product has the potential to be useful over data sparse areas, such as large bodies of water, where observations and model data may not be available.



2012 Summer Experiment

Pseudo Geostationary Lightning Mapper and GOES-R Convective Initiation Toolbox



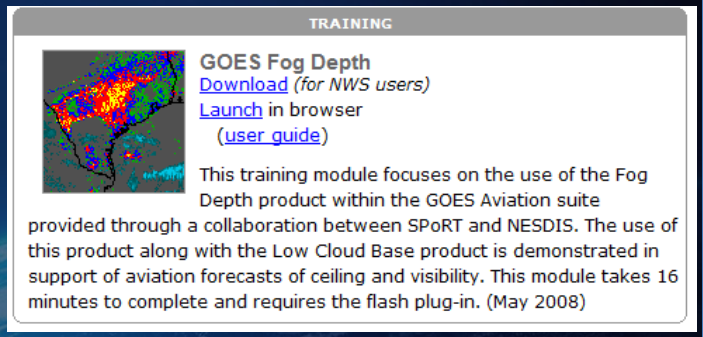


- The GLM will be of particular use in the tropics, as much convection in those areas contains intra-cloud lightning as well as CG
- The ABI OTD and GLM will also be of use in data sparse areas, such as over large bodies of water and regions with limited radar coverage

Training and Education

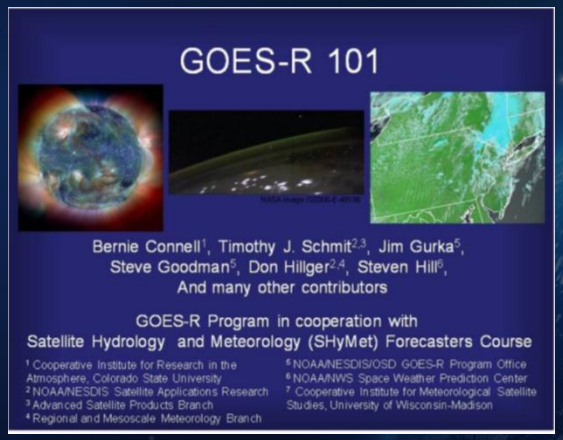
Online Training Modules

- GOES-R: Benefits of Next-Generation Environmental Monitoring (COMET)
- GOES-R 101
- Satellite Hydrology and Meteorology for Forecasters (SHyMet)
- SPoRT product training modules
- Commerce Learning Center



Printed Materials

- GOES-R Fact Sheets (17)
- GOES-R Tri-fold



Outreach Projects (with NWSFOs)

- **COMET will reach out to the GOES-R Proving Ground Partners and connect them with university faculty to use current and prototype data products for the purpose of building a bridge from products that are currently available to those that will become available when GOES-R is launched.**

VISIT

Virtual Institute for Satellite Integration Training

FY11-12 Live Training Sessions

Synthetic Imagery in Forecasting Orographic Cirrus (January 2011)

Synthetic Imagery in Forecasting Severe Weather (February 2011)

Objective Satellite-Based Overshooting Top and Enhanced-V Anvil Thermal Couplet Signature Detection (February 2011)

Volcanoes and Volcanic Ash Part 2 (March 2011)

GOES-15 Becomes GOES-West (December 2011)

VISIT Satellite Chats (short, interactive discussions, Q&A, monthly since February 2012)

Topics:

- Fog and Low-Cloud Detection from Satellite (2-22-2012)
- Water Vapor Imagery (3-21-2012)
- Satellite Related Severe Weather Products (4-25-2012)
- Fire Weather Imagery and Products (5-23-2012)
- Mesoscale Convective Vortices (6-27-2012)

Synthetic Imagery in Forecasting Low Clouds and Fog (April 2012)

Pseudo GOES Lightning Mapper (May 2012)

Tropical Cyclone Intensity Model Guidance Used by NHC (June 2012, updated)

Tropical Cyclone Track Model Guidance Used by NHC (June 2012, updated)

Convective Cloud Top Cooling, UW Convective Initiation Algorithm (July 2012)

Future Plans: 2013 And Beyond

- Continue to apply lessons learned to incorporate new improvements each year. Example:
  - From HWT Spring Experiment… obvious that forecaster application of new products improves with additional training. In 2012 forecasters had access to satellite training material prior to arrival in Norman.
- Demonstrate products and decision aids in NOAA Testbeds, NCEP Centers, WFOs, and the NWS Proving Ground at Training Center
- Transition from Warning Related Products to remaining Baseline Products, Day 2 Future Capability, fused products, Decision Aids, Decision Support Services
- Continue to develop, demonstrate, and test as part of decision support services
- Enhanced JPSS, international, and broadcaster community collaboration

Summary

Pre-launch demonstrations with proxy data benefits users to prepare them to fully exploit all GOES-R instruments and capabilities

- Continue to apply lessons learned to incorporate new improvements each year.
- Demonstrate products and decision aids in NOAA Testbeds, NCEP Centers, WFOs, and the NWS Proving Ground at Training Center
- Transition of Water Cycle/Hydrology Future Capabilities, fused products, Impact-based Decision Aids, Decision Support Services
- Continue to develop, demonstrate, and test as part of decision support services
- Enhanced collaboration with JPSS, international, and private sector community